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UNITED STATES DISTRICT COURT
DISTRICT OF OREGON
PORTLAND DIVISION

STEVEN M. NELSON, Plaintiff, vs. UNITED STATES OF AMERICA, by and through the NATIONAL OCEANIC and ATMOSPHERIC ADMINISTRATION, Defendant	Case No.: 3:19-cv-01761-HZ IN ADMIRALTY DECLARATION OF RITA KIRCHHOFER IN SUPPORT OF THE UNITED STATES' MOTION FOR SUMMARY JUDGMENT Date: May 10, 2021 Time: 10 a.m. Courtroom 15A HON. MARCO A. HERNANDEZ

I, Rita Kirchhofer, declare as follows:

1. I am currently a Managing Engineer at Exponent Engineering & Scientific Consulting. I specialize in failure analysis, metallurgy, corrosion, materials structure-properties relationships and applying the principles to integrity assessment and management. I have 10 years of experience in the areas of design, failure analysis and risk management of a wide range of commercial products and structures. My focus includes the mechanical behavior of materials (strength, fracture, and fatigue), corrosion performance, materials testing as applied to material selection, and materials characterization. I have worked on materials systems ranging from ferrous alloys, high-grade steels, stainless steels, nickel alloys, polymers, and ceramic materials. I have applied my materials and forensic science skills to investigate a wide variety of products and processes, and to perform risk assessments of large infrastructures. I have experience dealing with fatigue, deformation and fracture of materials, fractography, failure analysis, and corrosion (including corrosion fatigue, environmentally assisted cracking, and hydrogen embrittlement) as applied to structures, chemical and power plant components, construction industry, condensers, boilers, oil and gas pipelines, piping, pressure vessels, reactor vessels, welds and brazing.

I hold three academic degrees: (1) dual Bachelor of Science degrees in Materials Science and Engineering, and Mechanical Engineering from University of California – Davis, (2) a Master of Science in Metallurgical and Materials Engineering from Colorado School of Mines, and (3) a Doctor of Philosophy in Materials Science from Colorado School of Mines. I am a licensed Professional Engineer in the field of Metallurgical Engineering in California and Colorado. I am also a Certified Welding Inspector by the American Welding Society.

2. Based on my review of the available documentation, photographs of the subject gangway, and photographs of the broken welded joints, I have reached the following conclusions:

- The subject welds were located on the underside of the gangway, where the welded joint in the middle of the span was located. The welds broke due to lack of fusion and/or lack of

penetration of the fillet weld joining two sections of the gangway.

- In fillet welds, such as the subject welds, lack of fusion and/or lack of penetration defects are not detectable by visual methods, since the weld cap hides the root area of the weld (*i.e.* internal weld discontinuity). Similarly, and in most cases, lack of fusion and/or lack of penetration defects cannot be discovered by non-destructive visual means because the weld integrity may appear intact until sudden failure of the weld.

3. A visual inspection of the subject welds would not have detected the discontinuities in the welds, which were hidden under the weld cap. Moreover, it was not possible to visually detect the presence of a cracks growing from an internal weld discontinuity.

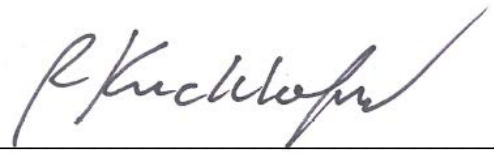
4. In order to identify the lack of fusion and/or lack of penetration discontinuities in the subject welds, a vessel owner would have had to undertake one of the following in-depth analysis and testing:

- Phase Array Ultrasonic Testing (PAUT): An ultrasonic probe is used to scan the internal configuration of the weld. Volumetric discontinuities, such as porosity and lack of fusion and/or penetration may be identified.

- Radiographic Testing (RT): This testing uses a high-power x-ray or gamma ray source to probe the internal configuration of the weld. Porosity, lack of fusion and/or penetration can be found with RT, but only large volumetric defects can be detected in complex welds (such as T-joints). RT is expensive and increase in the restriction of using of ionizing radiation sources creates limitation to the utility of the method. Therefore, RT is typically only used for critical equipment such as pressure vessels and in nuclear applications.

I verify under penalty of perjury, in accordance with 28 U.S.C. § 1746, that the foregoing is true and correct.

Dated this 22nd day of February, 2021



Rita Kirchhofer

CERTIFICATE OF SERVICE

I hereby certify that, on March 1, 2021, a true and correct copy of the foregoing DECLARATION OF RITA KIRCHHOFER IN SUPPORT OF THE UNITED STATES' MOTION FOR SUMMARY JUDGMENT was served electronically through CM/ECF on:

Charles Robinowitz
Law Offices of Charles Robinowitz

Attorneys for Plaintiff
Steven M. Nelson

/s/Eric Kaufman-Cohen
ERIC KAUFMAN-COHEN